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SETBACK SELECTOR SWITCH

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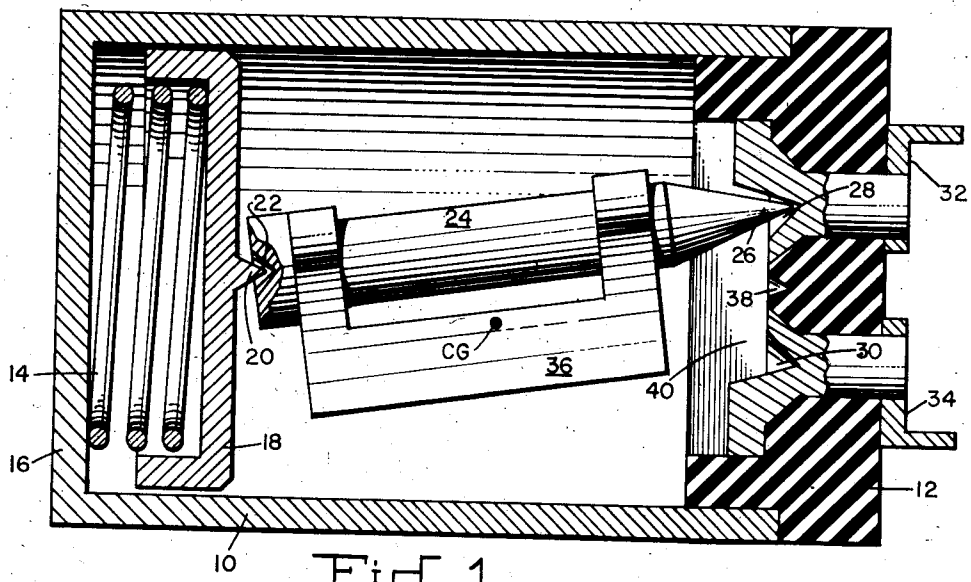


Fig. 1.

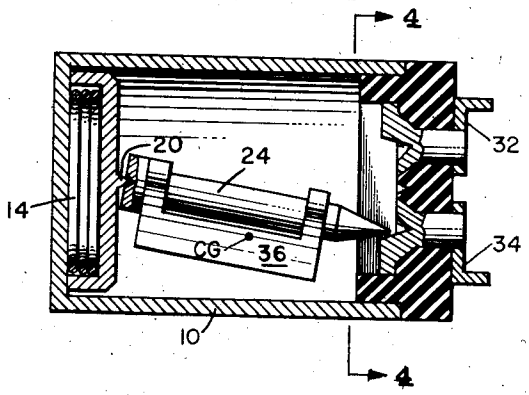


Fig. 2.

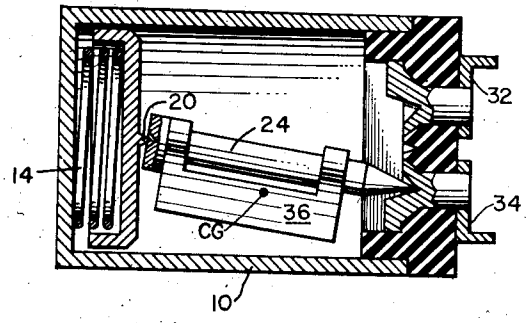
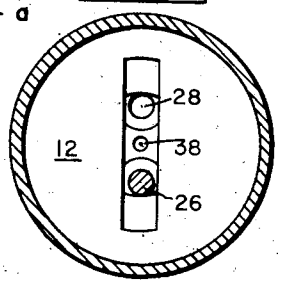


Fig. 3.

Fig. 4.



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SETBACK SELECTOR SWITCH

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6 Claims. (Cl. 200—61.45)

This invention relates to switches and more particularly to switches contained in ordnance projectiles.

Many ordnance projectiles containing electrical components have selector switches so that alternate components may be used. For example, by a switch it is possible to control whether the projectile is to be armed when fired or armed some short time later; or it is possible to control whether the projectile fires on contact or some short time later. This invention provides a selector switch operated by setback—i. e., the acceleration occurring when the projectile is fired or launched. One embodiment comprises a spring-mounted pivoted arm with an adjustable eccentric weight attached. When the switch is subjected to acceleration, the arm compresses the spring and pivots in the direction of the weight; then when the acceleration ceases the spring pushes the arm into one of two contacts toward which the weight was pointed.

An object of this invention is to provide a switch for ordnance projectiles which selects one of a plurality of contacts automatically upon setback.

Another object is to provide such a switch which may be set as to which contact to select without external connections.

A further object is to provide such a switch which has an exceptionally long storage life.

Still further objects are to achieve the above with a device that is sturdy, simple, and reliable, yet cheap and easy to manufacture.

The specific nature of the invention as well as other objects, uses and advantages thereof will clearly appear from the following description and from the accompanying drawing, in which:

Fig. 1 is an axial section of a switch in accordance with the invention before setback.

Fig. 2 is an axial section of the switch during setback with acceleration in the direction of arrow *a*.

Fig. 3 is an axial section of the switch after setback.

Fig. 4 is a cross-sectional view of the switch taken on line 4—4 of Fig. 2.

As seen in the drawing, a housing in the form of a cylindrical can **10** is closed at its forward open end by insulating plug **12**. For long storage life, the enclosure thus formed is hermetically sealed and may be filled with an inert gas. Within the can a compression spring **14** is between rearward end **16** and spring cover **18**. On the forward surface of the spring cover is a conic pivot **20** coaxial with the can, which fits in conic depression **22** in the rear end of cylindrical switch arm **24**. The forward end of the switch arm **24** has point **26** which fits in conic seat **28** or **30** in the rearward ends of alternate contacts **32** and **34**, respectively, which are set in insulating plug **12**. These seats **28** and **30** are in symmetrical positions about the axis of the can **10**. Eccentric weight **36** is mounted for rotation about the axis of switch arm **24**. The arm **24** and weight **36** are proportioned so that the center of gravity of the two is

at CG as indicated. The weight **36** may be journaled about the arm **24** to swing freely, or the weight **36** and arm **24** may be integral and the arm **24** pivot about its longitudinal axis. Slot **40** on the rear side of insulating plug **12** guides the arm **24** between the seats **28** and **30**. All parts except insulating plug **12** are of conducting material.

If it is desired that grounded arm **24** move from contact **32** to contact **34** upon setback, the switch unit is positioned with contact **34** down as shown in Fig. 1. The eccentric weight **36**, being mounted for rotation, points toward this contact. When the contacting projectile (not shown) is fired in the direction of the arrow the acceleration acting on the mass of arm **24** and weight **36** causes spring **14** to compress as seen in Fig. 2. This movement frees the point **26** from its former seat. Gravity and the setback forces acting on the center of gravity CG then combine to cause arm **24** to pivot downward about pivot **20** until the point seats into conic seat **30**. When the acceleration ceases as seen in Fig. 3, spring **14** will push the point **26** firmly into electrical connection with this portion of contact **34**. As set back is generally many times greater than the acceleration of gravity, the switch will operate in any position; the only limitation is that eccentric weight **36** must be pointing toward the contact to be connected. For this reason the switch cannot be used in a rotating projectile nor in one where the position of the projectile in the launching device cannot be controlled. In practice it has been found that dependable operation is obtained even if the axis of can **10** is within a few degrees of vertical.

Various modifications readily suggest themselves. For example, additional contacts could be added. A conic seat **38** in the center of insulating plug **12** permits the switch arm **24** to originally be placed in a neutral position, so that neither contact **32** nor **34** is connected until setback.

Therefore it will be apparent that the embodiment shown is only exemplary and that various modifications can be made in construction, materials, and arrangement within the scope of the invention as defined in the appended claims.

I claim:

1. An acceleration operated switch comprising in combination: a housing with a longitudinal axis; a pivot mounted at one end of said housing; first and second contacts seats electrically insulated from one another and mounted at the other end of said housing diametrically opposed to one another; bias means for urging said pivot in the direction of said seats; a switch arm having one end mounted on said pivot and the other end held to make contact with said first seat by the pressure of said pivot on said switch arm; and means for placing the center of gravity of said switch arm below said longitudinal axis regardless of the position of said switch; whereby acceleration of said switch along said axis in the direction of said seats causes said switch arm to disengage from said first seat and transfer to said second seat when said switch is placed in a position such that said first seat is above said second seat, said switch arm remaining in said first seat when said switch is placed in a position such that said first seat is below said second seat.

2. The invention in accordance with claim 1 wherein said bias means includes a spring urging said pivot toward said seats.

3. The invention in accordance with claim 2 wherein said means for placing the center of gravity comprises a weight eccentrically mounted to freely rotate about the axis of said switch arm under the influence of gravity.

4. The invention in accordance with claim 3 wherein

said pivot is mounted on a spring cover and is connected to said housing by said spring.

5. The invention in accordance with claim 4 wherein said housing is hermetically sealed and is filled with an inert gas.

6. A set-back switch comprising in combination: a circular housing having a longitudinal axis; a cup-shaped spring cover concentric with said housing and adapted to slide along the inner surface of said housing; a helical spring mounted inside of the cup of said spring cover between one end of said housing and said cover; first and second contact seats mounted at the other end of said housing diametrically opposed to one another, said seats being electrically insulated from one another; a pivot mounted at the center of said spring cover, said spring biasing said cover and pivot towards said seats; a cylindrical switch arm having one end mounted on said pivot and the other end held to make electrical contact with said first seat by the pressure of said pivot on said switch

arm, said switch arm being electrically insulated from said seats; a weight eccentrically mounted to freely rotate about the axis of said switch arm under the influence of gravity; whereby acceleration along said axis in a direction towards said seats causes said switch arm to disengage from said first seat and transfer to said second seat when said switch is placed in a position such that said first seat is above said second seat, said switch arm remaining in said first seat when said switch is placed in a position such that said first seat is below said second seat.

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